

sub A

What is claimed is:

1. An apparatus that measures electrical characteristics of an electrical element within a semiconductor device in a packaged state, comprising;
4 an electrical characteristic measurer that is connected to the electrical element
5 and a pad of the semiconductor device, and that is driven in response to a control
6 signal to output a value that is indicative of the electrical characteristics of the electrical
7 element to the pad,
8 the control signal being activated in an electrical characteristic measuring mode,

2. The apparatus of claim 1, further comprising a control signal generator
that receives at least one bit of an address signal that is received at an address pin of
the semiconductor device, and that generates the control signal responsive thereto.

3. The apparatus of claim 1, wherein the electrical element is selected from
a group including an NMOS transistor, a PMOS transistor and a resistor, and the value
is indicative of one of a threshold voltage and a saturation current of the NMOS
transistor, one of a threshold voltage and a saturation current of the PMOS transistor,
and a resistance of the resistor.

4. The apparatus of claim 1, wherein the electrical characteristic measurer
includes an NMOS transistor having a drain and a source, the drain being connected to
the pad and the source being connected to a terminal of the electrical element, a size of
the NMOS transistor being the same as a size of an NMOS transistor connected to a
5 pad of a data input/output pin.

1 5. The apparatus of claim 1, wherein the electrical element is a transistor,
2 and the value is indicative of one of a threshold voltage and a saturation current of the
3 transistor.

1 6. The apparatus of claim 5, wherein the transistor is an NMOS transistor.

1 7. The apparatus of claim 5, wherein the transistor is a PMOS transistor.

Cont X
2 8. The apparatus of claim 1, wherein the electrical element is a resistor, and
the value is indicative of a resistance of the resistor.

1 9. An apparatus for measuring characteristics of an electrical element within
a semiconductor device in a packaged state, comprising:

2 a control signal generator, coupled to receive an address signal of the
semiconductor device, that generates a control signal; and

3 an electrical characteristic measurer, to which the electrical element is
connected, that is driven responsive to the control signal to output a value indicative of
the electrical characteristics of the electrical element.

1 10. The apparatus of claim 9, wherein the electrical element is one of a
2 transistor and a resistor, the electrical characteristic measurer comprising at least one
3 transistor characteristic measuring unit that measures the electrical characteristics of
4 the transistor, and a resistor characteristic measuring unit that measures the electrical
5 characteristics of the resistor, as selectable by the control signal.

1 11. The apparatus of claim 10, wherein the electrical characteristics of the
2 transistor are one of a threshold voltage and a saturation current.

1 12. The apparatus of claim 10, wherein the electrical characteristics of the
2 resistor is a resistance.

1 13. The apparatus of claim 10, wherein the control signal generator generates
2 the control signal responsive only to two bits of the address signal.

1 14. The apparatus of claim 9, wherein the control signal is generated during
2 an electrical characteristic measuring mode, after the semiconductor device is
3 packaged.

1 15. A method of measuring electrical characteristics of an electrical element
2 within a semiconductor device in a packaged state, comprising:

3 connecting the electrical element of the semiconductor device to an electrical
4 characteristic measurer, after the semiconductor device is packaged;

5 controlling the semiconductor device to enter into a predetermined electrical
6 characteristic measuring mode;

7 generating a control signal; and

8 driving the electrical characteristic measurer responsive to the control signal, to
9 provide a value indicative of the electrical characteristics of the electrical element.

1 16. The method of claim 15, wherein said controlling comprises:

2 receiving an address signal provided to an address pin of the semiconductor
3 device; and

4 entering into a specific sub mode of the electrical characteristic measuring mode
5 responsive to a value of at least one bit of the address signal.

1 17. The method of claim 15, wherein the electrical element is selected from a
2 group including an NMOS transistor, a PMOS transistor and a resistor, and wherein the
3 value provided during said driving is indicative of one of a threshold voltage and a
4 saturation current of the NMOS transistor, one of a threshold voltage and a saturation
5 current of the PMOS transistor, and a resistance of the resistor.

*Add
A2*

100-000000000000